

INCH-POUND

MIL-DTL-52525E
w/AMENDMENT 1
25 March 2004
SUPERSEDING
MIL-DTL-52525E
30 June 1998

DETAIL SPECIFICATION

FITTINGS, HOSE, REUSABLE, FIELD-ATTACHABLE AND CLAMP-HALVES, GENERAL SPECIFICATION FOR

This specification is approved for use by all Departments and
Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers reusable, field-attachable, hydraulic, 37° flare and 4-bolt split-flange hose fittings, and 4-bolt split-flange clamp-halves, for use with wire reinforced hydraulic hose.

1.2 Classification (see 6.7). Fittings are of the following types:

Type 100R1	-	For use with 100R1 single wire braid reinforcement hose.
Type 100R2	-	For use with 100R2 double wire braid reinforcement hose.
Type 100R10	-	For use with 100R10 4-spiral-wrap reinforcement hose.
Type 100RE	-	For use with 4-spiral-wrap reinforcement hose.
Type 100R12	-	For use with 4-spiral-wrap reinforcement hose.

1.2.1 Clamp-halves. Clamp-halves have the following pressure rating:

3000 psi - MIL-DTL-52525/16.

1.2.2 Part number. See applicable specification sheet for military part number.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Defense Supply Center, Columbus, DSCC-VAI, 3990 East Broad Street, Columbus, OH 43216-5000, by using the Standardization Document Improvement proposal (DD 1426) appearing at the end of this document or by letter.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

- * QQ-P-416 - Deleted
- * A-A-59267 - Phosphate Coating Compounds, Manganese or Zinc Base (for Ferrous Metals)

DEPARTMENT OF DEFENSE

- MIL-PRF-2104 - Lubricating Oil, Internal Combustion Engine, Combat/Tactical Service
- * DOD-P-16232 Deleted
- MIL-DTL-52471 - Hose and Hose Assemblies, Rubber, Hydraulic Pressure Type, General Specification for
- MIL-DTL-52525/16 - Fittings, Clamp-Halves for 4-Bolt Split-Flange
- MIL-DTL-52525/17 - Fittings, Flange to Port Connections for 4-Bolt Split-Flange

(See supplement 1 for list of specification sheets.)

STANDARDS

FEDERAL

- FED-STD-H28 - Screw Thread Standard for Federal Services

DEPARTMENT OF DEFENSE

- MIL-STD-889 - Dissimilar Metals

- * (Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or www.dodssp.daps.mil or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

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2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY FOR QUALITY (ANSI)

ANSI/ASQ -Z1.4 - Sampling Procedures and Tables for Inspection by Attributes
(DOD) adopted)

(Application for copies of this ANSI publications should be addressed to the American National Standards Institute, 11 West 42nd Street, New York, NY 10036.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on
Iron and Steel (DOD adopted)

(Application for copies of ASTM publications should be addressed to the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B46.1 - Surface Texture (Surface Roughness, Waviness, and Lay)
(DOD adopted)

(Application for copies of ASME publications should be addressed to the American Society of Mechanical Engineers, 345 E. 47th Street, New York, NY 10017.)

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

- * SAE-AMS-QQ-P-416 - Plating, Cadmium (Electrodeposited)
- SAE J343 - Test and Test Procedures for SAE 100R Hydraulic Hose and Hose
 Assemblies, Standard
- SAE J518 - Hydraulic Flanged Tube, Pipe, and Hose Connections,
 4-Bolt Split-Flange Type
- * SAE J516 - Hydraulic Hose Fitting
- * SAE J517 - Hydraulic Hose

- * (Copies of these documents are available from <http://www.sae.org> or SAE International, 400
Commonwealth Drive, Warrendale, PA 15096-0001.)

2.4 Order of precedence. In the event of a conflict between this document and the references cited herein (except for related associated specifications or specification sheets), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheet. In the event of any conflict between the requirements of this specification and the specification sheet, the latter shall govern (see 6.2).

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3.1.1 Fittings. Fittings shall be compatible with hose conforming to MIL-DTL-52471 and as specified in tables I through V.

TABLE I. Type 100R1 fittings for 100R1 single wire braid hose.

Specification sheet	Size range inch	Termination	Style	Configuration
MIL-DTL-52525/5	1/4 thru 1-1/4	37° Flare	Screw-on	Straight
MIL-DTL-52525/6	1/4 thru 1	37° Flare	Screw-on	45° bent tube
MIL-DTL-52525/7	1/4 thru 1	37° Flare	Screw-on	90° bent tube short drop
MIL-DTL-52525/8	1/4 thru 1	37° Flare	Screw-on	90° bent tube long drop

TABLE II. Type 100R2 fittings for 100R2 double wire braid hose.

Specification sheet	Size range inch	Termination	Style	Configuration
MIL-DTL-52525/1	1/4 thru 2	37° Flare	Screw-on	Straight
MIL-DTL-52525/2	1/4 thru 1	37° Flare	Screw-on	45° bent tube
MIL-DTL-52525/3	1/4 thru 1	37° Flare	Screw-on	90° bent tube short drop
MIL-DTL-52525/4	1/4 thru 1	37° Flare	Screw-on	90° bent tube long drop
MIL-DTL-52525/10	1/2 thru 2	4-bolt split-flange	Screw-on	Straight
MIL-DTL-52525/11	1/2 thru 2	4-bolt split-flange	Screw-on	45° bent tube
MIL-DTL-52525/12	1/2 thru 2	4-bolt split-flange	Screw-on	90° bent tube

TABLE III. Type 100R10 fittings for 100R10 4-wire spiral hose.

Specification sheet	Size range inch	Termination	Style	Configuration
MIL-DTL-52525/9	3/4 thru 1-1/2	37° Flange	Screw-on	Straight
MIL-DTL-52525/13	3/4 thru 1-1/2	4-bolt split-flange	Screw-on	Straight
MIL-DTL-52525/14	3/4 thru 1-1/2	4-bolt split-flange	Screw-on	45° bent tube
MIL-DTL-52525/15	3/4 thru 1-1/2	4-bolt split-flange	Screw-on	90° bent tube
MIL-DTL-52525/23	1 thru 2	4-bolt split-flange	Clamp-on	Straight
MIL-DTL-52525/24	1 thru 2	4-bolt split-flange	Clamp-on	45° bent tube
MIL-DTL-52525/25	1 thru 2	4-bolt split-flange	Clamp-on	90° bent tube short drop

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TABLE IV. Type 100RE fittings for 100RE 4-spiral-wrap reinforcement hose.

Specification sheet	Size range inch	Termination	Style	Configuration
MIL-DTL-52525/31	3/4 and 1	37° Flare	Screw-on	Straight
MIL-DTL-52525/32	3/4 and 1	37° Flare	Screw-on	45° bent tube
MIL-DTL-52525/33	3/4 and 1	37° Flare	Screw-on	90° bent tube
MIL-DTL-52525/34	3/4 and 1	4-bolt split-flange	Screw-on	Straight
MIL-DTL-52525/35	3/4 and 1	4-bolt split-flange	Screw-on	45° bent tube
MIL-DTL-52525/36	3/4 and 1	4-bolt split-flange	Screw-on	90° bent tube

TABLE V. Type 100R12 fittings for 100R12 4-spiral-wrap reinforcement hose.

Specification sheet	Size range inch	Termination	Style	Configuration
MIL-DTL-52525/37	3/4 and 1	37° Flare	Screw-on	Straight
MIL-DTL-52525/38	3/4 and 1	37° Flare	Screw-on	45° bent tube
MIL-DTL-52525/39	3/4 and 1	37° Flare	Screw-on	90° bent tube
MIL-DTL-52525/40	3/4 and 1	4-bolt split-flange	Screw-on	Straight
MIL-DTL-52525/41	3/4 and 1	4-bolt split-flange	Screw-on	45° bent tube
MIL-DTL-52525/42	3/4 and 1	4-bolt split-flange	Screw-on	90° bent tube

3.2 Qualification. Fittings furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable Qualified Products List (QPL) before contract award (see 4.3 and 6.3).

- * 3.2.1 Qualification by similarity. Qualification by similarity for any size, or any slash sheet, associated with MIL-DTL-52525 may be requested by any manufacturer already listed with QPL-52525. The qualifying activity will review the requests based on similarity of the requested size and slash sheet to those already listed on QPL-52525. Similarity will be evaluated based on criteria such as test data, materials, manufacturing equipment, manufacturing processes, or other relevant criteria.

3.3 Materials. Material shall be steel or malleable iron. Silver solder shall not be used; however, welding or brazing will be permitted.

3.3.1 Material deterioration prevention and control. The fittings shall be fabricated from compatible corrosion resistant materials, or shall be treated to prevent corrosion and deterioration that may be encountered in operating and storage environments.

3.3.1.1 Dissimilar metals. Dissimilar metals shall not be used in intimate contact with each other unless protected against galvanic corrosion. Dissimilar metals and methods of protection are defined in MIL-STD-889.

3.3.1.2 Identification of materials and finishes. The contractor shall identify materials, finishes and treatments used and shall make this information available upon request to the contracting officer or designated representative.

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3.3.1.3 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials shall be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs. Used, rebuilt or manufactured components, pieces and parts shall not be incorporated in the fittings.

3.4 Threads. Screw threads shall be in accordance with FED-STD-H28, except threads that grip the hose are optional.

3.5 Low temperature. The fittings, while attached to the hose and while at a temperature of -40 °F, shall withstand bending of the hose to its minimum bend radius, in not less than 8 or more than 12 seconds without evidence of leakage, rupture, slippage, or detachment as specified in 4.5.2.3.

* 3.5.1 Mating hose. The 100R(X) series of hose is similar to SAE J517, except for layline for MIL-DTL-52471 and qualification.

3.6 Reusability. The fittings shall be capable of withstanding two cycles of assembly to hose, proof pressure, and disassembly without evidence of leakage, rupture, detachment, or deformation that prevents disassembly and reassembly. The fittings shall meet all provisions of this specification when assembled to a third length of hose.

3.7 Overtightening torque. The 37° flare-style fittings shall be capable of withstanding 15 applications of overtightening torque of the swivel nut to the value shown on the applicable specification sheet. The overtightening torque shall not result in distortion which prevents freely turning the swivel nut by hand. The overtightening torque shall not cause damage to the 37° flare seat that prevents sealing as specified in 4.5.2.4.

3.8 Split-flange fittings. Split-flange fittings shall be furnished with clamp-halves conforming to MIL-DTL-52525/16, and capscrews, lockwashers, and O-rings as specified in MIL-DTL-52525/17.

3.8.1 Flange head. The flange head for 4-bolt split-flange fittings shall conform to SAE J518, standard series.

3.9 Clamp-halves. Four-bolt split-flange clamp-halves shall be furnished in pairs.

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3.10 Impulse. The fittings, while attached to the hose and after being subjected to a temperature of 212 °F for 24 hours, shall be capable of withstanding an impulse pressure for the number of cycles specified in table VI without evidence of leakage, rupture, detachment, slippage, or deformation that prevents disassembly or reassembly when tested as specified in 4.5.2.7. Clamp-halves shall be capable of withstanding 300,000 impulse cycles without evidence of leakage, rupture, detachment, or deformation.

TABLE VI. Impulse cycles.

Type of fitting	Number of impulse cycles
100R1	150,000
100R2	150,000
100R10	300,000
100RE	500,000
100R12	500,000

3.11 Proof pressure. The fittings, while attached to hose, shall be capable of withstanding a pressure equal to twice the maximum operating pressure specified in the applicable specification sheet without evidence of leakage, slippage, rupture, deformation, or detachment from the hose as specified in 4.5.2.5.

3.12 Burst pressure. The fittings, while attached to hose, shall be capable of withstanding a pressure equal to four times the maximum operating pressure specified in the applicable specification sheet without evidence of leakage, rupture, or detachment from the hose as specified in 4.5.2.6.

3.12.1 Burst pressure for clamp-halves. Clamp-halves shall be capable of withstanding the applicable burst pressure specified in MIL-DTL-52525/16 without evidence of leakage, rupture, detachment, or deformation as specified in 4.5.2.6.1.

3.13 Finish. The fittings shall be zinc plated, phosphate coated, or cadmium plated as specified in the following:

- a. Zinc plate conforming to ASTM B633, type II, Fe/Zn 13.
 - * b. Phosphate coating conforming to A-A-59267 type Z.
 - * c. Cadmium plate conforming to SAE-AMS-QQ-P-416, type II, class 2 except the embrittlement test need not be run.
- * Alternative corrosion protection methods may be used providing the corrosion resistance requirement, 96 hours exposure to salt spray, of SAE-AMS-QQ-P-416 is met.

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3.14 Marking. Marking shall be as specified in the applicable specification sheet, and shall include the manufacturer's name or trademark, size, and one of the following fitting types as applicable.

<u>Marking</u>	<u>For use with</u>
R1	Single wire braid hose
R2	Double wire braid hose
R10	4-spiral-wrap hose
RE	4-spiral-wrap reinforcement hose
R12	4-spiral-wrap reinforcement hose

Marking shall be applied directly to a visible surface of the assembled fitting by metal stamping, forging, casting, or molding. The marking may be applied in any order. Location of marking shall minimize the possibility of removal or defacement of part identification, by normal wear.

3.15 Instruction sheet. Each fitting shall be accompanied by an instruction sheet. The instruction sheet shall detail hose end preparation, assembly to and disassembly from hose and mating fittings, and required torques. When 4-bolt split-flange clamp-halves are furnished, the instruction sheet shall include the information required to attach the clamp-half to a port face.

3.16 Tools. The fittings shall couple to and uncouple from the hose and shall assemble to and disassemble from mating fittings and surfaces without special tools.

3.17 Workmanship. Machined surfaces of fittings and clamp-halves shall be free of burrs and longitudinal tool marks. Unless a finer finish is specified in the applicable specification sheet, sealing surfaces shall be smooth, except that annular toolmarks up to 100 microinches (μin) roughness-height-rating (rhr) as defined in ASME B46.1, will be acceptable. All other machined surfaces shall not exceed 250 μin rhr. Unmachined surfaces, such as forging surfaces and bar stock flats, shall be free of cracks, laps, and seams. Weld and braze joints shall be free of pits, blisters, slivers, and laminations.

4. VERIFICATION

4.1 Classification of inspection. The inspection requirements specified herein are classified as follows:

- a. Qualification inspection (see 4.3).
- b. Conformance inspection (see 4.4).

4.2 Inspection and tests. The inspection and tests specified herein are intended to verify that the items produced meet or exceed the performance requirements specified.

4.3 Qualification inspection.

4.3.1 Examination. The hose fittings and 4-bolt split-flange clamp-halves shall be examined in accordance with 4.5.1. Presence of one or more defects shall be cause for rejection.

4.3.2 Tests. Qualification inspection shall consist of all the tests listed herein.

4.3.2.1 Fittings and clamp-halves. In addition to the examination of 4.3.1, fittings and 4-bolt split-flange clamp-halves shall be tested as specified in table VII in the order shown. Failure of any test shall be cause for rejection (see 6.3).

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TABLE VII. Qualification test schedule.

Schedule		Test	Test paragraph	Requirement paragraph	Number of specimens per qualified hose
Test number	Sequence				
1	1	Reusability	4.5.2.2	3.6	4
	2	Low temperature	4.5.2.3	3.5.1	
	3 <u>1/</u>	Proof pressure	4.5.2.5	3.11	
2 <u>1/</u>	1	Reusability	4.5.2.2	3.6	4
	2 <u>1/</u>	Burst pressure	4.5.2.6 and 4.5.2.6.1 <u>2/</u>	3.12	
3	1	Reusability	4.5.2.2	3.6	4
	2	Impulse	4.5.2.7	3.10	
4 <u>3/</u>	1	Overtightening torque	4.5.2.4	3.7	4
	2	Proof pressure	4.5.2.5	3.11	

1/ The burst pressure test may be performed on the low temperature specimens instead of the proof test, in which case separate burst test specimens will not be required and test no. 2 need not be run.

2/ Applicable when fittings with attached parts are being qualified.

3/ Applicable when 37° flare fittings are to be supplied.

4.3.2.2 Clamp-halves, 4-halves, 4-bolt split-flange. When only 4-bolt split-flange clamp-halves are to be qualified, four clamp-halves shall be tested as specified in 4.5.2.6.1 and an additional four clamp-halves shall be tested as specified in 4.5.2.7.1. Failure of any test shall be cause for rejection.

4.4 Conformance inspection.

4.4.1 Unit of product.

4.4.1.1 Fittings. One fitting with two clamp-halves (when applicable) shall be one unit of product.

4.4.1.2 Clamp-halves. When clamp-halves are furnished separately (without fitting), two clamp-halves (a pair) shall be one unit of product.

4.4.2 Lot. A lot shall consist of not more than 1000 units of product of the same size, type, style, and configuration, as applicable.

4.4.3 Sampling.

4.4.3.1 Tests (see 6.6). Sampling for tests shall be in accordance with ASQ-Z1.4, except that when a fitting sample size is not a multiple of two, additional fittings, sufficient in number to make the sample size a multiple of two, shall be selected at random from the lot. When a fitting terminates in a 4-bolt split-flange head, each fitting shall be accompanied by clamp-halves, capscrews, lockwashers, and an O-ring in accordance with MIL-DTL-52525/17.

4.4.4 Samples and tests. Test samples selected in accordance with 4.4.3.1 shall be subjected to all the tests specified in 4.5.1.

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4.4.4.1 Rejection and retest. When one or more items selected from a lot fails to meet all the requirements specified herein, the entire lot shall be rejected. Samples may be submitted for retesting only after the manufacturer has furnished details concerning the previous rejection and the action taken to correct the defects in the lot.

4.4.5 Fittings. Fittings selected in accordance with 4.4.3.1 shall be assembled to hose and tested as specified in 4.5.2.5. The number of allowable defects shall be as specified in the contract (see 6.2).

4.5 Inspection procedure.

4.5.1 Examination. The fittings and clamp-halves shall be examined as specified herein for the following defects:

101. Materials not as specified.
102. Materials are not resistant to corrosion and deterioration or treated to be resistant to corrosion and deterioration for the applicable storage and operating environments (see 3.3.1).
103. Dissimilar metals are not treated or effectively insulated from each other (see 3.3.1.1).
104. Contractor does not have documentation available for identification of material, material finishes or treatment (see 3.3.1.2).
105. Used, rebuilt or remanufactured components, pieces, or parts incorporated in the fittings (see 3.3.1.3).
106. Threads not as specified (see 3.4).
107. Dimensions not in accordance with the applicable specification sheet.
108. Silver solder used in fabrication (see 3.3).
109. Type, size, termination, style, or configuration not in conformance with the applicable specification sheet.
110. Flange head not as specified (see 3.8.1).
111. O-ring, capscrews, or lockwashers missing or not as specified (see 3.8).
112. Clamp-halves not furnished in pairs (see 3.9).
113. Finish not as specified (see 3.13).
114. Marking missing, illegible, or not as specified (see 3.14).
115. Instruction sheets not complete or missing (see 3.15).
116. Special tools required (see 3.16).
117. Workmanship not as specified (see 3.17).

4.5.2 Tests.

4.5.2.1 Test assembly preparation. Test specimens (hose assemblies) shall be assembled in accordance with the fitting manufacturer's instruction sheet. Test specimens of QPL samples shall be marked with white ink, on the hose, at the skirt of the fitting. The free length of hose measured between fittings shall be determined as follows:

$$90^\circ \text{ bend hose free length} = + 2D$$

$$180^\circ \text{ bend hose free length} = \pi r + 2D$$

Where: D = hose outside diameter

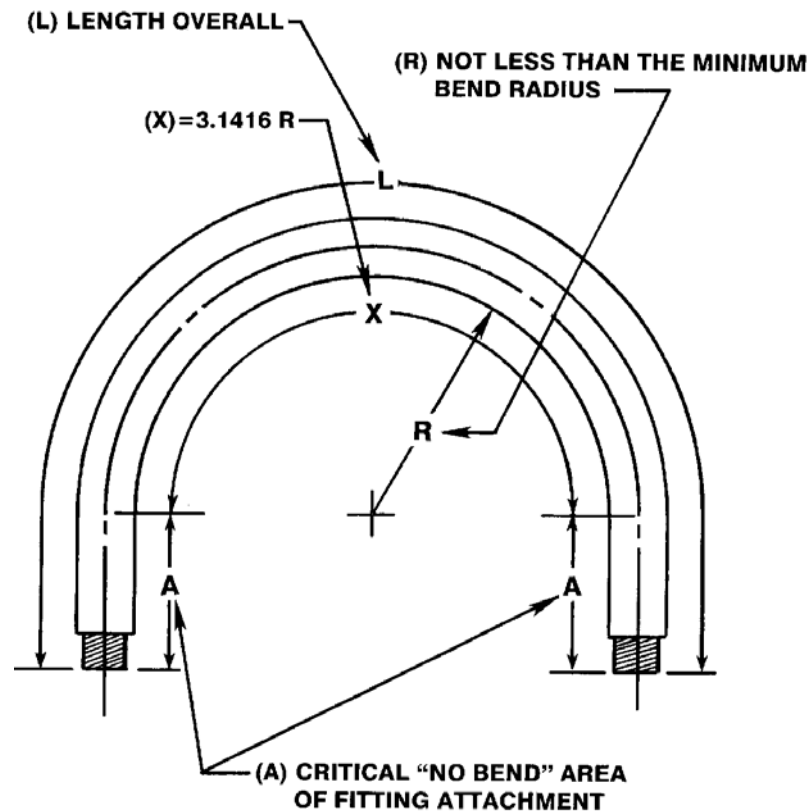
r = minimum bend radius specified on figure 1, and in table VIII.

π = 3.14

4.5.2.2 Reusability. The fittings shall be subjected to the following reusability test:

- a. Assemble the fittings to 15 inch lengths of hose.
- b. Proof-pressure test these test assemblies in accordance with 4.5.2.5. If there is evidence of leakage, rupture, slippage, or detachment, discontinue the test.
- c. Disassemble and examine the fitting, and discard the hose. If there is evidence of permanent deformation that prevents disassembly or reassembly, discontinue the test.
- d. Repeat steps a, b, and c, using the same fitting and new 15 inch lengths of hose.
- e. Reassemble the same fittings to new lengths of hose in accordance with 4.5.2.1.

After assembly, the fittings shall be subjected to the low temperature and impulse tests as specified in table VII. Evidence of leakage, rupture, detachment, slippage, or permanent deformation that prevents disassembly or reassembly shall constitute failure of this test.



1. Stationary hose installation formula is $L = 2A + X$
2. A = Coupling length plus 2 X hose ID

FIGURE 1. Minimum bend radius.

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TABLE VIII. Minimum bend radius dimensions.

Hose size	Single wire braid 100R1 inches	Double wire braid 100R2 inches	4-spiral-wrap 100R10 inches
1/4	4	4	5
3/8	5	5	6
1/2	7	7	8
3/4	9 1/2	9 1/2	11
1	12	12	14
1 1/4	16 1/2	16 1/2	18
1 1/2	20	20	22
2	25	25	28

4.5.2.3 Low temperature. The low temperature test shall be conducted at -40 °F in accordance with the cold bend test specified in SAE J343 except the uncapped hose or hose assembly shall be preconditioned by immersion in oil conforming to MIL-PRF-2104, grade 10, for a minimum of 24 hours at a minimum temperature of 212 °F. Evidence of splitting or cracking or inability to pass the proof pressure test specified in 4.5.2.5 shall constitute failure of this test.

4.5.2.4 Overtightening torque. The 37° flared-style fitting shall be subjected to the overtightening torque test by assembling to a mating fitting. The threads of the swivel nut of the fitting shall be lubricated with oil conforming to MIL-PRF-2104, grade 10, prior to this test. The swivel nut of the fitting shall be tightened on the mating fitting to the appropriate overtightening torque value required in the applicable specification sheet and loosened. This sequence shall be repeated 15 times. Evidence of permanent deformation, stripped threads, or failure of the swivel nut to swivel freely by hand after 15 overtightening operations shall constitute failure of this test. Upon completion of this test, the fittings shall be assembled to a 15 inch length of approved hose and proof pressure tested in accordance with 4.5.2.5 as required in table VII.

4.5.2.5 Proof pressure. The proof pressure test shall be conducted in accordance with SAE J343. The test pressure shall be a pressure that is equal to twice the maximum operating pressure specified in the applicable specification sheet. Evidence of leakage, rupture, or detachment of a fitting shall constitute failure of this test.

4.5.2.6 Burst pressure. The burst pressure test shall be conducted in accordance with SAE J343. The test pressure shall be equal to or greater than four times the maximum operating pressure specified in the applicable specification sheet. Evidence of leakage, rupture, or detachment of a fitting shall constitute failure of this test.

4.5.2.6.1 Clamp-halves, 4-bolt split-flange. When 4-bolt split-flange clamp-halves are required, the clamp-half burst pressure test shall be conducted as follows:

- Attach a flange-head to the burst pressure machine using two 4-bolt split-flange clamp-halves, an O-ring, four cap-screws, and four lockwashers, and torque to the values specified by the manufacturer's instruction sheet.
- Apply pressure (through the port face to the flange-head) until failure.
- Pressure application shall be at a constant rate so as to attain the pressure listed in the applicable specification sheet within a period of not less than 15 seconds and not more than 30 seconds.

Nonconformance to 3.12.1 shall constitute failure of this test.

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4.5.2.7 Impulse. The impulse test shall be conducted in accordance with SAE J343 except as specified herein. The uncapped test specimens shall be preconditioned by immersion in 10 weight oil conforming to MIL-PRF-2104, grade 10, at a minimum temperature of 212 °F for a minimum of 24 hours. The test pressure shall be in accordance with table IX. The number of impulse cycles shall be in accordance with table X. The impulse test oil temperature shall be 200 °F. Evidence of leakage, rupture, detachment or slippage of a fitting shall constitute failure of a test specimen. Failure of a test specimen below the minimum number of cycles listed in table X, or failure of the specimens to attain the average number of impulse cycles listed in table X shall constitute failure of this test (see 3.10).

TABLE IX. Impulse test pressure.

Fitting type	Test pressure
100R1	125 percent of the maximum operating pressure specified in the applicable specification sheet for hose 1 inch ID and smaller and 100 percent for hoses larger than 1 inch ID.
100R2 100R10 100RE 100R12	133 percent of the maximum operating pressure specified in the applicable specification sheet.

TABLE X. Impulse cycles and calculation method. 1/

Type of fitting	Minimum cycles allowed 2/	Minimum average	Maximum cycles for computing
100R1	100,000	150,000	200,000
100R2	100,000	150,000	200,000
100R10	225,000	300,000	375,000
100RE	225,000	300,000	375,000
100R12	425,000	500,000	575,000

1/ Average number of cycles =
$$\frac{N_1 + N_2 + N_3 + N_4}{4}$$

Where

N₁ = Number of cycles withstood by first test assembly.

N₂ = Number of cycles withstood by second test assembly.

N₃ = Number of cycles withstood by third test assembly.

N₄ = Number of cycles withstood by forth test assembly.

2/ Inability of a test specimen to meet this number shall constitute failure.

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4.5.2.7.1 Four-bolt split-flange clamp-half. When only 4-bolt split-flange clamp-halves are required, the impulse test shall be conducted as follows:

- a. Attach a flange-head to the impulse machine using two 4-bolt split-flange clamp-halves, four capscrews, four lockwashers, and an O-ring, and torque to the values specified by the manufacturer's instruction sheet.
- b. Apply 300,000 impulse cycles to the flange-head through the port face.
- c. Impulse cycles and impulse wave shape shall be as specified in SAE J343.
- d. The impulse oil shall be maintained at 200 °F minimum.
- e. Impulse pressure shall be 4,000 psi.

Nonconformance to 3.10 shall constitute failure of this test.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature which may be helpful, but is not mandatory.)

6.1 Intended use. The items covered by this specification are military unique hose fittings and clamp halves used in military vehicle hydraulic systems requiring interoperability and compatibility with associated components and equipment. These items are required to withstand temperatures between - 40° F to 200° F. The qualification process ensures the items will meet the proof pressure and burst pressure requirements. The interoperability and compatibility has been assured through strict adherence to the military detail specification sheet requirements. Manufacturers of these items and users place great reliance on the detailed technical requirements to ensure the products meet the interoperability and compatibility requirements.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification and applicable specification sheet.
- b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2.1 and 2.3).
- c. Military specification sheet part number (see appropriate specification sheet).
- d. Identification of materials and finishes if required (see 3.3.1.2).
- e. Packaging requirements (see 5.1).

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* 6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Products List QPL 52525 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from the Commander, Defense Supply Center, Columbus, DSCC-VAI, 3990 East Broad Street, Columbus, OH 43216-5000 or email vqp.go@dla.mil primary and secondary to vap.mp@dla.mil.

6.4 Bulk hose and reusable fittings. To insure interchangeability of fittings and hose within the supply system, reusable fittings should be tested with a standard bulk hose of the applicable type and size selected by the qualifying activity.

6.5 Definitions.

6.5.1 Leakage. Any passage of fluid from the inner portion of the fittings to the outer portion as determined by sight, touch, or pressure loss. Leaks occur through the fitting body, at the junction between the hose and fitting, or at the sealing surface, thread or flange face, of the fitting.

6.5.2 Rupture. A leak which causes visible damage to the fitting or hose adjacent to the fitting as evidenced by the rapid loss of volume of the pressurizing agent, or sharp reduction in pressure.

6.5.3 Slippage of a fitting. Permanent movement of a fitting, measured when the hose is in a relaxed condition.

6.5.4 Detachment. The loss or partial loss of contact between the fitting and the hose to which it is attached or the loss or partial loss of contact between the fitting and a test fixture fitting by virtue of thread stripping or severance of a fitting body.

6.6 Conformance testing. It is recommended that the acquiring activity waive sample testing on lots that contain fewer than 500 units of product when the contractor has tested and furnished a like item to the Government within the past year.

6.7 Classification changes. Changes in classification of the fittings between this revision of the specification and the previous editions are as follows:

<u>MIL-F-52525C</u>	<u>MIL-F-52525D</u>	<u>MIL-F-52525E</u>
Type A	Type 100R1	None
Type B	Type 100R2	None
Type C	Type 100R10	None
Type D	Deleted	_____
Type E	Deleted	_____
None	Type 100RE	None
None	Type 100R12	None

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* 6.7.1 Different than commercial.

Layline
Qualification
Zinc electrodeposited
Phosphate and cadmium
96 hour salt spray test

* 6.8 Subject term (key word) listing.

Hydraulic hose connector
Split-flange
High pressure
Medium Pressure
Low pressure
Cadmium plating
Phosphate plating
Zinc plating

* 6.9 Changes from previous issue. Deleted

* 6.10 Environmentally preferable material. Environmentally preferable materials should be used to the maximum extent possible to meet the requirements of this specification. Table XI lists the Environmental Protection Agency (EPA) top seventeen hazardous materials targeted for major usage reduction. Use of these materials should be minimized or eliminated unless needed to meet the requirements specified herein (see section 3).

* TABLE XI. EPA top seventeen hazardous materials.

Benzene	Dichloromethane	Tetrachloroethylene
Cadmium and Compounds	Lead and Compounds	Toluene
Carbon Tetrachloride	Mercury and Compounds	1,1,1 - Trichloroethane
Chloroform	Methyl Ethyl Ketone	Trichloroethylene
Chromium and Compounds	Methyl Isobutyl Ketone	Xylenes
Cyanide and Compounds	Nickel and Compounds	

* 6.11 Guidance on use of alternative parts with less hazardous or nonhazardous materials. This specification provides for a number of alternative plating materials via the PIN. Users should select the PIN with the least hazardous material that meets the form, fit and function requirements of their application.

* 6.12 Amendment notations. The margins of this specification are marked with asterisks to indicate modifications generated by this amendment. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations.

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CONCLUDING MATERIAL

Custodians:

Army - AT
Navy - SH
Air Force - 99
DLA - CC

Preparing activity:

DLA - CC

(Project 4730-2548-000)

Review activities:

Army - AR
Navy – MC,SA
Air Force - 71

NOTE: The activities listed above were interested in this document as of the date of this document. Since organization and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <http://www.dodssp.daps.mil>.